

Claims

I Claim:

1. A method of restoring dimensions to an article, the method comprising the
5 steps of:

providing an article having a section requiring dimensional restoration;
providing a preform having first and second layers made from different materials;
and

joining the preform to the article.

10 2. The method of claim 1, wherein the first layer of the preform includes a
nickel-based alloy.

15 3. The method of claim 2, wherein the second layer of the preform includes a
nickel-based alloy and a second alloy.

4. The method of claim 3, wherein said second alloy is a transient liquid phase
alloy.

20 5. The method of claim 1, wherein the first layer of the preform is between
about 0.005 inch and about 0.015 inch in thickness.

25 6. The method of claim 5, wherein the second layer of the preform is between
about 0.020 inch and about 0.030 inch in thickness.

7. The method of claim 3, wherein the joining step includes subjecting the
article and preform to heat, wherein the preform melts to conform to the shape of the
article.

30 8. The method of claim 1, wherein the article is an airfoil.

9. The method of claim 8, wherein the airfoil is a turbine vane.

10. A method of refurbishing an article to restore a desired flow area, the method comprising the steps of:

providing an article having a section requiring dimensional restoration;
providing a preform having first and second layers made from different materials;
5 placing the preform adjacent the section of the article requiring dimensional restoration; and
subjecting the article and preform to heat.

11. The method of claim 10, wherein the article and preform are subjected to
10 heat of between about 2125 degrees Fahrenheit and about 2155 degrees Fahrenheit for 15 minutes or less.

12. The method of claim 11, wherein the article and preform are thereafter
subjected to heat of between about 2125 degrees Fahrenheit and about 2155 degrees
15 Fahrenheit for 6 ½ hours or less.

13. The method of claim 12, wherein the article and preform are thereafter
subjected to heat of between about 1900 degrees Fahrenheit and about 1950 degrees
Fahrenheit for about 2 hours.

14. The method of claim 10, wherein the first layer of the preform includes a
nickel-based alloy.

15. The method of claim 14, wherein the second layer of the preform includes a
25 nickel-based alloy and a second alloy.

16. The method of claim 15, wherein said second alloy is a transient liquid
phase alloy.

17. A method of restoring dimensions of an airfoil, the method comprising the steps of:

providing an airfoil having a section requiring dimensional restoration;

providing a preform having first and second layers made from different materials;

5 preparing the airfoil for attachment of the preform thereto;

placing the preform adjacent a convex side of the airfoil; and

subjecting the airfoil and preform to heat so as to cause the preform to soften and conform to the airfoil.

10 18. The method of claim 17, wherein the preparing step includes the step of removing any protective coatings on the turbine vane

19. The method of claim 18, wherein the preparing step further includes the step of cleaning the turbine vane

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20. The method of claim 17, wherein the step of subjecting the airfoil and preform to heat includes the step of heating the airfoil and preform in a furnace or heat chamber.

20 21. The method of claim 20, wherein the airfoil is placed in the furnace or heat chamber with a convex side of the airfoil facing upwards.

22. The method of claim 17, wherein the first layer of the perform includes a nickel-based alloy.

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23. The method of claim 22, wherein the second layer of the perform includes a nickel-based alloy and a second alloy.

24. The method of claim 23, wherein said second alloy is a transient liquid phase alloy.

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25. A method of restoring dimensions to an article, the method comprising the steps of:

providing an article made of a material;

providing a preform having a first layer of a material similar to said article and a
5 second layer different than said first layer; and

joining the preform to the article.

26. The method of claim 25, wherein said first layer material is the same as
said article.

27. The method of claim 26, wherein said first layer is a nickel-based alloy.

28. The method of claim 27, wherein the second layer of the perform is a
nickel-based alloy and a second alloy.

29. The method of claim 28, wherein said second alloy is a transient liquid
phase alloy.

30. A preform for restoring dimensions to an article, comprising:
a first layer of a material similar to said article; and
a second layer of a material different than said first layer;
wherein said preform is joined to the article to restore said dimensions.

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31. The preform of claim 30, wherein said first layer material is the same as said article.

32. The preform of claim 31, wherein said first layer is a nickel-based alloy.

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33. The preform of claim 32, wherein the second layer of the perform is a nickel-based alloy and a second alloy.

34. The preform of claim 33, wherein said second alloy is a transient liquid phase alloy.

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